

# General Presentation

Company, Products & Services

**ICARUS**



A COMPREHENSIVE RANGE OF PRODUCTS AT YOUR SERVICE

GENERAL

VALVES

PIPING & FITTINGS

SERVICES

COMPANY  
PROFILE



TEST RANGE  
QUALITY ASSURANCE  
PACKAGE  
PROJECT MANAGEMENT  
...

EUROPEAN MANUFACTURER



GROUP

**.ICARUS**

PIPE & FITTING SUPPLIER  
(FULL PACKAGE)

VALVES, SUBSEA & SPECIAL PIECES  
MANUFACTURER



**HEADQUARTERS :**

Parc Industriel des Hauts Sarts, Zone 3  
Rue des Alouettes, 100 - 4041 Herstal  
Belgium

OWNED BRANDS

**.ICARUS**



**TOTAL SURFACE**

34,500 m<sup>2</sup>

**COVERED SURFACE**

8,300 m<sup>2</sup>

**Painting / Assembly / Tests / Repair :**  
Service Centers available in Asia for local support.

## INTEGRATED QUALITY MANAGEMENT

Handling company organization & management, product quality, health & security.



**ISO 9001**  
QUALITY MANAGEMENT SYSTEMS



**ISO 14001**  
ENVIRONMENTAL MANAGEMENT SYSTEMS



**ISO 45001**  
HEALTH & SAFETY MANAGEMENT SYSTEMS

## OTHER CERTIFICATIONS



**PED 2014 / 68 / EU**  
PRESSURE EQUIPMENT DIRECTIVE



**PE(S)R 2016 N°1105 (UKCA)**  
PRESSURE EQUIPMENT (SAFETY) DIRECTIVE



**EUROPEAN CONFORMITY**  
EC DIRECTIVES FOR RELATED PRODUCTS

## KEY TECHNICAL SKILLS

- Safety Officers
- Environmental Experts
- Quality Engineers
- Certified Agents:
  - Frosio III
  - Cofrend II
  - ACQPA level II & anticorrosive painting

## ACTIVITIES

- Production of valves, flanges and forged parts
- Supply of complete packages of piping and fittings



## MARKETS



**CLIENTS :** END-USERS / ENGINEERING / EQUIPMENT MANUFACTURERS

VALVES



Ø : 1/4" to 30"

Dual plate check valves	Wafer, solid lug, double flanged, hub & BW ends
Other check valves	Tilting, disc, swing, piston
Double block & bleed Ball valves	Ball x Ball (floating or T-M), Gate x Gate, Globe x Globe Various according to requirements Floating Trunnion-mounted
Gate & globe valves	Gate valves, globe valves, through conduit gate
Cupronickel valves	Gate, globe, check & ball

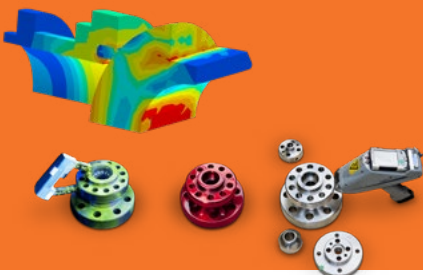
PIPING & FITTINGS



Ø : 1/4" to 102"

Pipes	Seamless or welded, finned, studded, all dimensions
BW fittings	Elbows, tees, lateral & barred tees, reducers, caps
Forged fittings	Elbows, tees, caps, plugs, nipples, couplings, unions, crosses, o-lets
Flanges	Compact, welding neck, socket weld, slip on, blind standards, long welding neck, orifice, anchor, swivel
Clamps & hubs	Clamps connectors, hubs
Bolting	Bolts, nuts, washers, screws, studs
Seals	API ring joints, anti-vibration, elastomer seals, engineering plastics, expansion joints, o-rings, hydraulic seals, spiral wound gaskets

SERVICES



ENGINEERING	
Calculation	Structural resistance, tightness, CFD
Design	3D modelling & 2D design drawings, reverse engineering
QUALITY	
Non-destructive tests	High pressure gas, magnetic, dye penetrant, PMI, ferrite, hardness, ultrasonic, pig test, fugitive emissions, cryogenic
Destructive tests	In accredited laboratory, according to requirements

	CLASS 150	CLASS 300	CLASS 600	CLASS 900	CLASS 1500	CLASS 2500	API 6A 3000	API 6A 5000	API 6A 10,000	API 6A 15,000
<b>CHECK VALVES - API 594</b>										
Dual plate Check	2"- 30"		2"- 24"			1 13/16" - 11"				
Axial Check	1"- 24"			-						
Disc Check	1"- 30"									
Other Checks	Tailor made check valves upon request									
<b>ON/OFF BALL VALVES</b>										
Floating Ball & DBB	1/2"- 6"	1/2"- 4"		1/2"- 2"			-			
Trunnion Ball & DBB	4"- 24"			1/2"- 16"		1/2" - 12"		1 13/16" - 7 1/16"		
<b>GGC VALVES</b>										
Gate										
Globe										
Check (Swing, Piston and Ball)										
	1/2" - 30"									
	1 13/16" - 4 1/16"									



Applications	Oil & Gas - Nuclear - Cryogenic - Oxygen Service - ...
Specific Features	3-Way Ball - Welded Design - Wafer Swing Check - Bellows sealed - ... Actuated as per request
Material	EUROPEAN ORIGIN ASTM – PED – NORSOK M630 – CUSTOMER SPECIFICATIONS  Main: Carbon Steel ( bare or with cladding ) / Stainless Steel / Duplex / Nickel Alloys / Cupro Aluminium / Titanium / ...

## OUR STRENGTHS

- Deadline flexibility & responsiveness
- Valves for use under extreme conditions:
  - Low and high temperatures
  - Corrosive and abrasive products
  - High pressures
- Custom solutions

- Standards-compliant valve production
- Non-standard valve production
- Machined from bars, castings or forgings
- Specific and particular grades
- Engineering department allows management of specific requirements (size constraint, pressure, corrosion, temperature, ...)

**ZERO GAS LEAKAGE DESIGNED & TESTED PRODUCTS**

We are able to provide special designed valves, manufactured with proven practice. The precision and expertise of our work allow us to deliver valves that have been tested with zero leakage results during high pressure gas tests.

**FIRE SAFE DESIGNED & TESTED PRODUCTS**

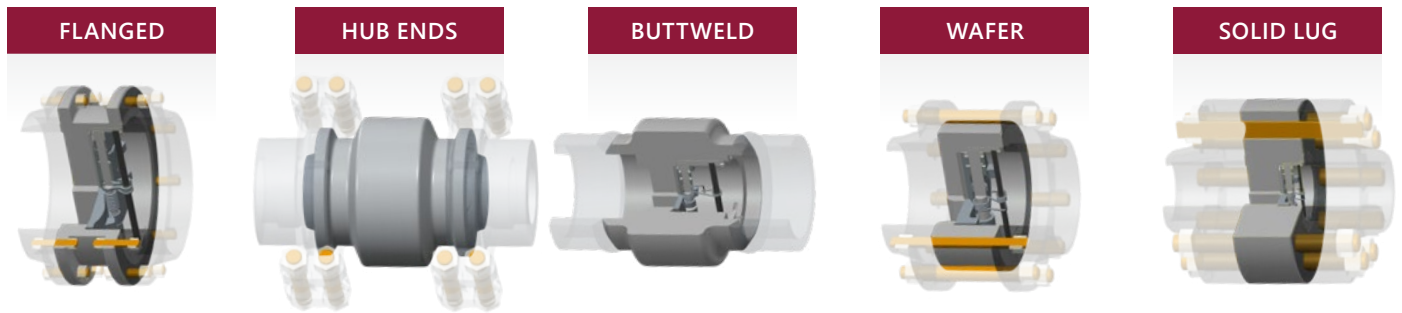
Our products are Fire-Safe Certified according to ISO 10497, API 607, API 6FA and BS 6755. These certifications ensure our Dual Plate check valves strictly meet the performance requirements once they are facing fire conditions.

**CRYOGENIC DESIGNED & TESTED PRODUCTS**

Our technical knowledge and expertise at your service for cryogenic applications: we are equipped to perform low temperature to cryogenic pressure tests with our test benches according to BS6364 or specific customer requirements.



Sizes	from 2" to 30"
Pressure Ratings	ANSI: 150 to 2500 – API: 3000 to 15,000
Material	Carbon Steel / Stainless Steel / Duplex Steel / Aluminium Bronze / Nickel Alloys / Titanium... Forged or cast construction
Seats	Metal to metal / Soft seat

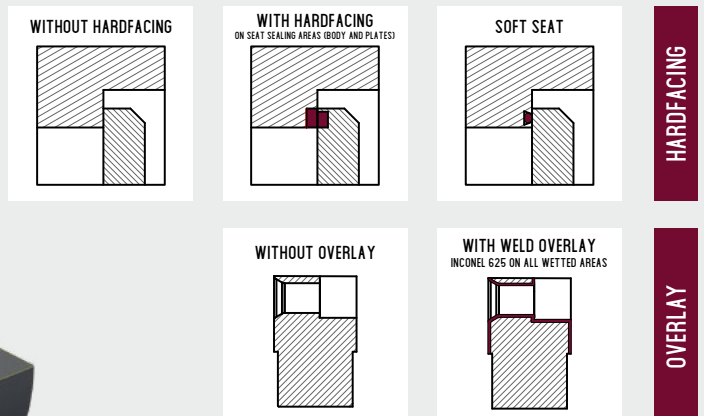
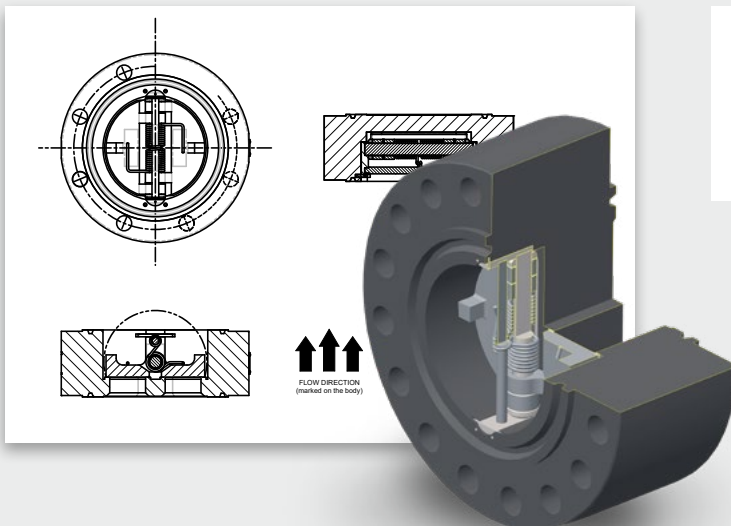
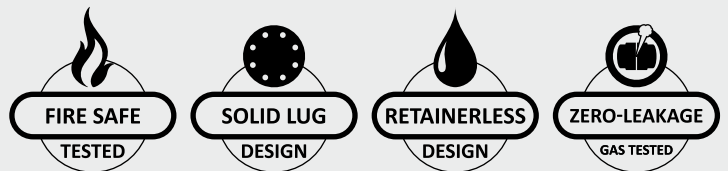


**Note:** Other sizes or configurations are available on demand.

## DESIGN

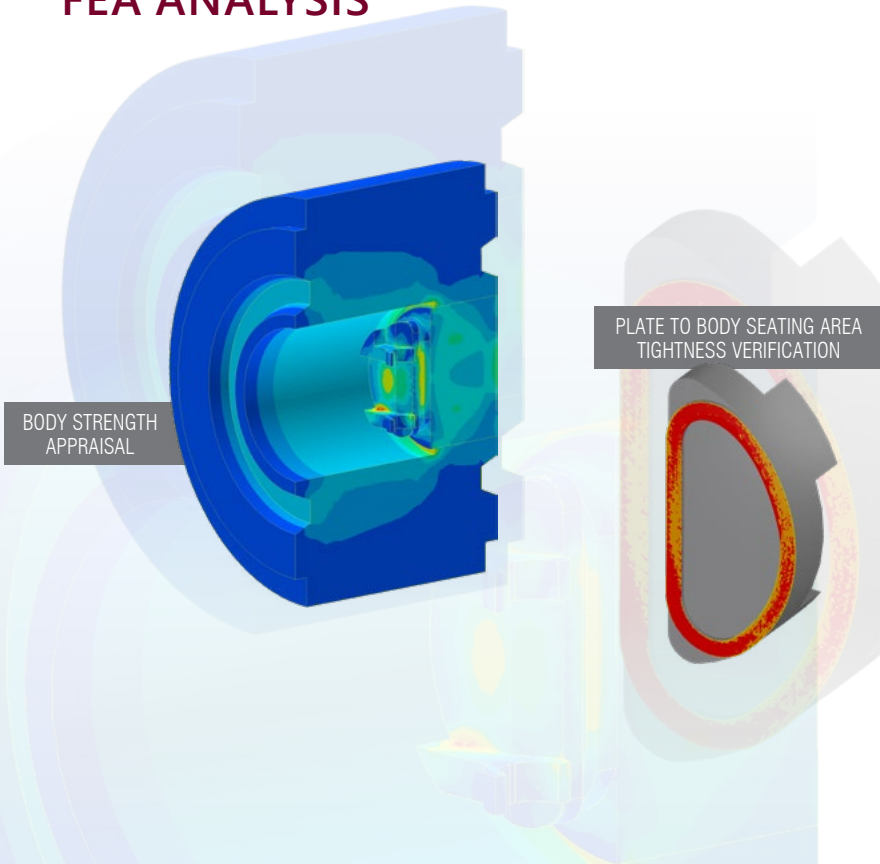
According to:

- API 594 - API 6A / 6D - ASME B16.5 - ...
- Customer specifications
- API & ISO Fire Safe certifications

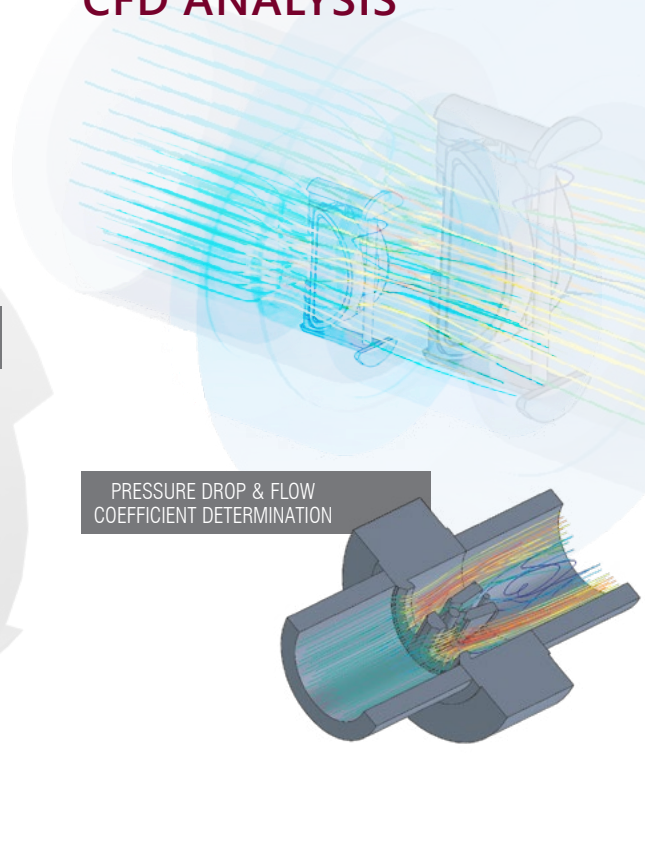


**For more information**  
Please refer to the dedicated brochure :  
**ICARUS - Dual plate check.**

FEA ANALYSIS

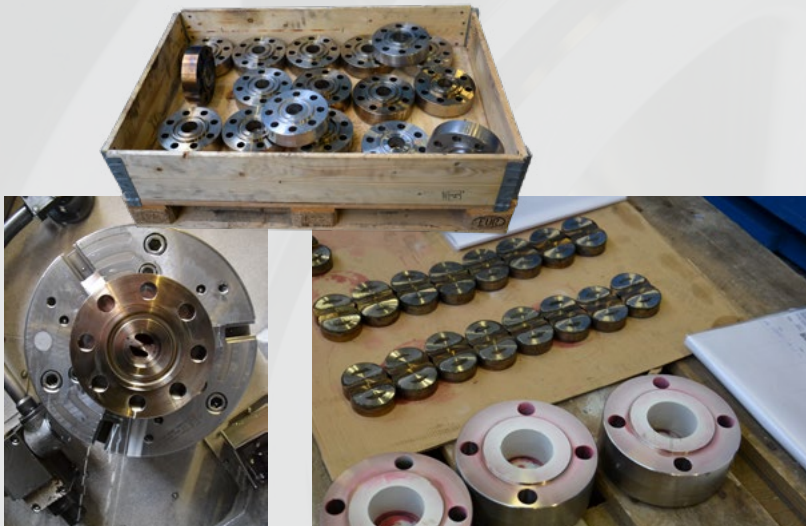
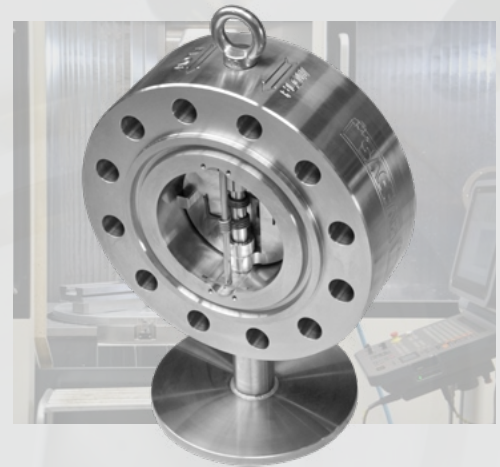


CFD ANALYSIS

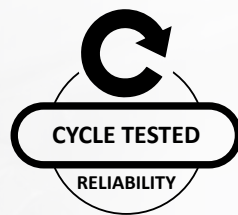


INHOUSE PRODUCTION

- Castings and forgings coming from top quality european suppliers
- Inhouse machinery, assembly & testing ( hydro / gas ... )
- Low/high pressure gas tested according to API 598 & ISO 5208
- Inhouse quality controls : MPE / DPE / Visual / Dimensional ...

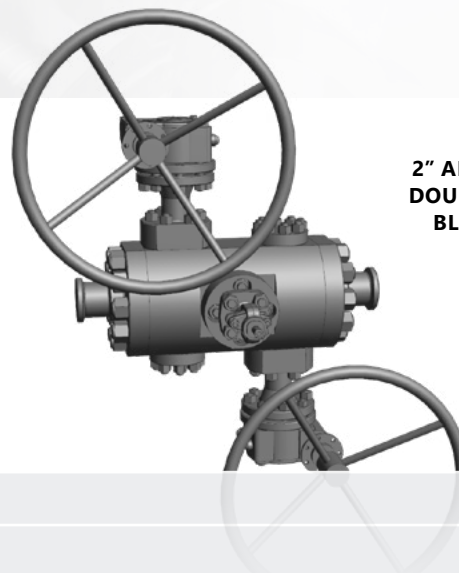


DESIGN



According to:

- API 6A (PSL3G)
- API 6D
- Customer specifications
- Fire Safe as per API 607 / ISO 10497
- FET as per ISO 15848-1 / -2



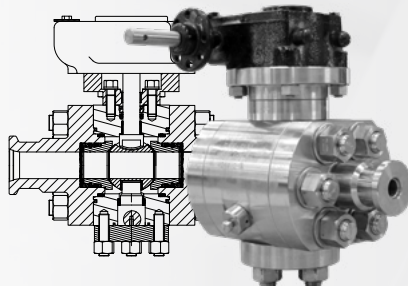
2" API 10,000 F55  
DOUBLE BLOCK &  
BLEED VALVE

Type	Trunnion Mounted or Floating
Sizes	from 1/2" to 24"
Pressure Ratings	ANSI : 150 to 2500 – API : 3000 to 15,000
Material	Carbon Steel / Carbon Steel + weld overlay (stainless steel, Nickel alloy) / Stainless Steel / Duplex Steel / Aluminum Bronze / Nickel Alloys / Titanium ... <b>Forged construction</b>
Seats	Metal to metal (HVOF TCC, HVOF CrCC) / Soft seat (PTFE, RPTFE, PEEK, DEVLON® ...) Single piston effect/ Double piston effect
End Connections	All connections available (including custom made arrangement) to: Flanged / Hub ends / Buttweld / ...



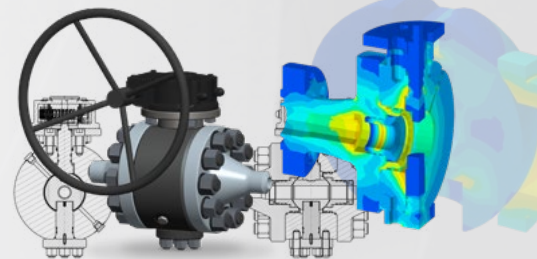
2" 1/16 TO 3" 1/8 API 5,000 INCONEL 625 OR CS/SS  
TRUNNION MOUNTED BALL VALVE

DESTINATION: QATAR (OFFSHORE)



3/4" TRUNNION MOUNTED  
BALL VALVE

DESTINATION: NORWAY



1" 13/16 TO 2" 1/16 API 10,000 GR60K  
TRUNNION MOUNTED BALL VALVE

DESTINATION: INDONESIA

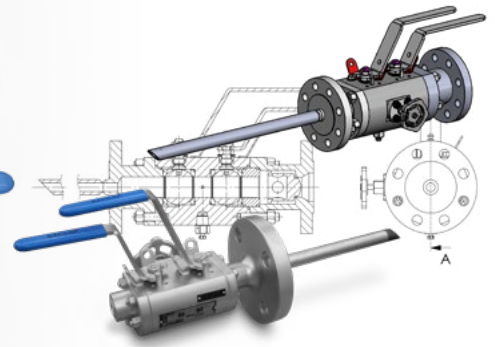
DBBs FOR INSTRUMENTATION, INJECTION,...



**1/2" 2500# F51  
DOUBLE BLOCK & BLEED VALVE**  
DESTINATION: NORWAY



**DOUBLE BLOCK & BLEED  
GLOBE / NEEDLE / BALL VALVE**



**DOUBLE BLOCK & BLEED  
WITH INJECTION QUILL**

SPECIAL DESIGN BALL VALVES & DBBs



**2" 4500# CARBON STEEL  
DOUBLE 3 WAYS VALVE**  
DESTINATION: NORWAY



**2" 300# F321 (-46°C TO 160°C)  
BALL VALVE WITH STEM EXTENSION  
(FOR INSULATION)**  
DESTINATION: NORWAY



**8" 2500# 316  
CRYOGENIC BALL VALVE**  
DESTINATION: ALGERIA

LARGE SIZE BALL VALVES & DBBs



**12" 1500# CARBON STEEL  
TRUNNION MOUNTED BALL VALVE**  
APPLICATION: OFFSHORE



**20" 1500# CARBON STEEL  
TRUNNION MOUNTED BALL VALVE**  
DESTINATION: QATAR (OFFSHORE)



FET TESTED  
ISO 15848-1 CLASS B C01

**12" / 16" / 24" 1500# CARBON STEEL - 24" 1500  
DOUBLE BLOCK & BLEED VALVE**  
DESTINATION: UAE (OFFSHORE)



**PIPES**

- SEAMLESS & WELDED
- FINNED / STUDDED
- ALL DIMENSIONS



**BW FITTINGS**

- ELBOWS
- TEES
- LATERAL & BARRED TEES
- REDUCERS
- CAPS



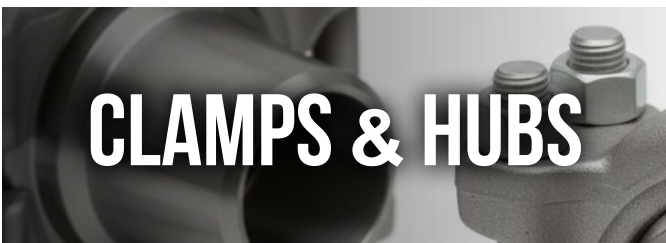
**FORGED FITTINGS**

- ELBOWS
- TEES
- CAPS
- PLUGS
- NIPPLES
- COUPLINGS
- UNIONS
- CROSSES
- O-LETS



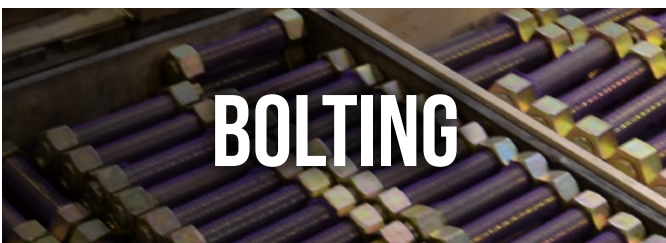
**FLANGES**

- COMPACT FLANGES
- STANDARD FLANGES
- LONG WELDING NECK
- FULLY DESIGNED & CALCULATED FLANGES
- ORIFICE
- ANCHOR
- SWIVEL



**CLAMPS & HUBS**

- CLAMPS CONNECTORS
- HUBS



**BOLTING**

- BOLTS
- NUTS
- WASHERS
- SCREWS
- STUDS



**SEALS**

- API RING JOINTS
- ANTI VIBRATION
- ELASTOMER SEALS
- ENGINEERING PLASTICS
- EXPANSION JOINTS
- O-RINGS
- HYDRAULIC SEALS
- SPIRAL WOUND GASKETS

## STAINLESS STEEL CORROSION RESISTANCE

- 304L
- 321
- 316L
- 316 MO+
- 317L
- ALLOY 20
- ALLOY 28
- 904L
- 19.25 HMo
- 254 SMO®
- 310L
- URANUS® S1

## ALLOY & STAINLESS STEEL HIGH TEMPERATURE

- P11
- P22
- P5
- P9, P91
- 304H
- 321H
- 347H
- 310S

## AUSTENITIC-FERRITIC STEEL

DUPLEX :

UNS S31803 / S32205

SUPER DUPLEX :

UNS S32750 / S32760

## NICKEL & NICKEL ALLOY

- ALLOY 600
- ALLOY 601
- ALLOY 625
- ALLOY 825
- ALLOY 400
- ALLOY 200/201
- ALLOY C276
- ALLOY C22
- ALLOY 800 / 800H / 800HT

## CARBON STEEL

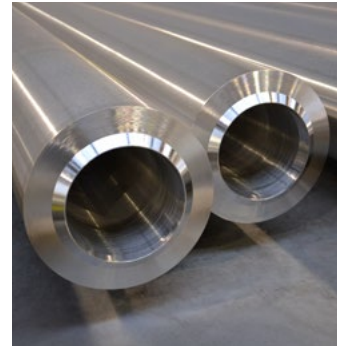
- A106 GR B
- A105
- A234WPB
- P265 GH
- API 5L GR B
- LOW TEMPERATURE :
- LF2, A333 GR 6, WPL6
- LF3, A333 GR 3, WPL3
- HIGH YIELD STRENGTH :
- API 5L X52-60-65-70-80

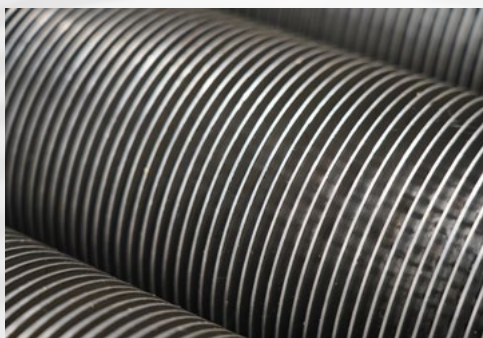
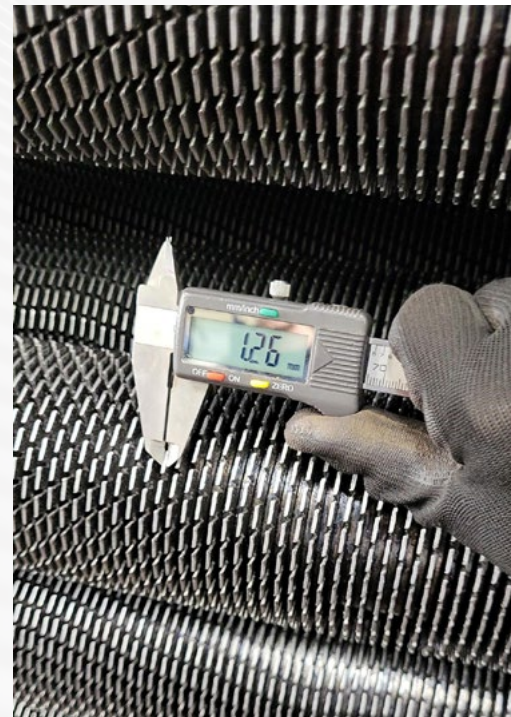
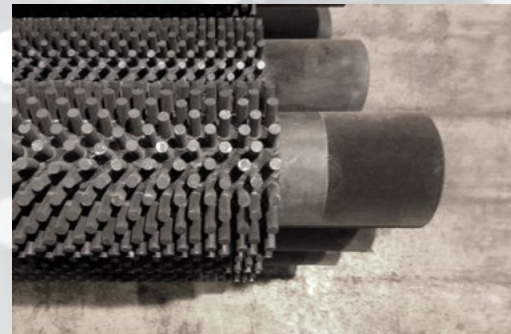
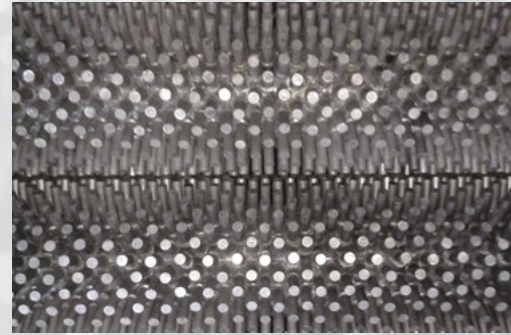
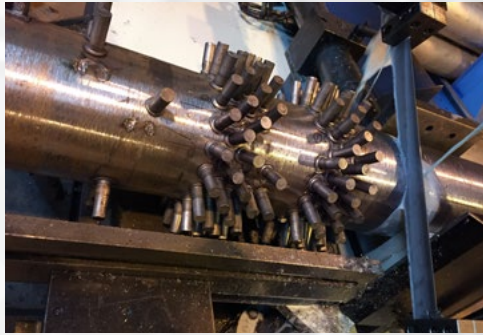
... this is a non-exhaustive list, Do not hesitate to contact us for other needs.

MATERIAL COMPARISON

ICARUS

PDF VERSION DOWNLOAD  
[WWW.ICARUS-BE.COM](http://WWW.ICARUS-BE.COM)







**DSS / SDSS / HYCS**  
**2200T.**  
AVERAGE  
PER FPSO



**BY SEA, BY PLANE OR EVEN BY TRAIN FROM EUROPE TO CHINA**  
Custom solutions for all needs

**FAST DELIVERY = FAST ASSEMBLY**

- Agreements with mills to optimise delivery time
- Ability & capacity to manage simultaneously multiple FPSO projects

**TOTAL  
EGINA**

**ENI  
CORAL FLNG**

**PETROBRAS  
MERO/BUZIOS**

**BP  
SKARV/QUAD**

**ENI  
GOLIATH**

**ONGC  
KAKINADA**



## SPECIAL FORGINGS

ALL SIZES FROM 1/2" UP TO 24" (EXT. Ø) & LARGER, UP TO 36" ON REQUEST, MAX LENGTH UP TO 3500MM

High strength carbon steel, stainless steel forgings, including duplex and super duplex, nickel alloy, copper alloy and titanium alloy.

- BUCKLE ARRESTORS
- PIPE ANCHORS
- HANGER FLANGES
- TEES AND BARRED TEES
- WYES
- FLANGES API6A/B – MSS SP44 – ASME B16.5
- COMPACT FLANGES NORSOK L005

## EXAMPLES OF PARTNERSHIP

Partners forge masters working on our design and drawings :



## STANDARD & CUSTOM MADE FITTINGS

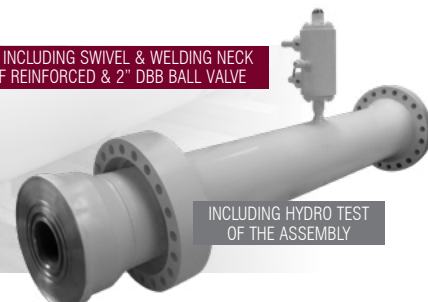
SPECIAL DOUBLE TEE FOR PIPE IN PIPE LINE: 8"X2"X3/4"

**MATERIAL:**  
ASTM A694 F65  
+ A625 WELD OVERLAY  
PROJECT: BLOCK 15



SPOOL ASSEMBLY 20"X2" (900#) INCLUDING SWIVEL & WELDING NECK FLANGES, LONG WELD NECK SELF REINFORCED & 2" DBB BALL VALVE

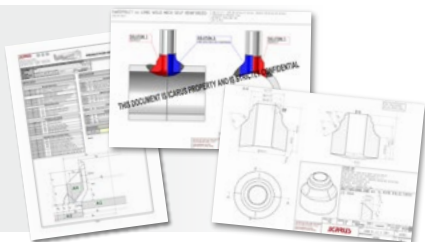
**MATERIAL:**  
ASTM A694 F65  
+ A625 WELD OVERLAY  
PROJECT: EGP3B



INCLUDING HYDRO TEST OF THE ASSEMBLY

CALCULATION NOTES ACCORDING TO ASME B31.3

**MATERIAL:**  
ASTM A694 F65  
PROJECT: BLOCK 17/18



PIGGABLE WYE AND FLANGES 22"X18"

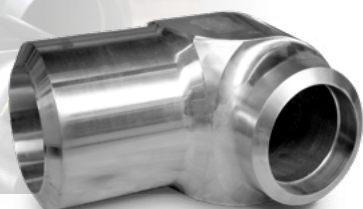
**MATERIAL:**  
ASTM A694 F65  
PROJECT: EGP3B



(INCLUDING ASSEMBLY)

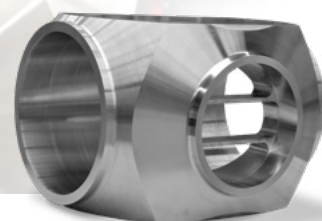
FORGED ELBOW

**MATERIAL:**  
ASTM A694 F65  
PROJECT: BLOCK 15



REDUCED BARRED TEE

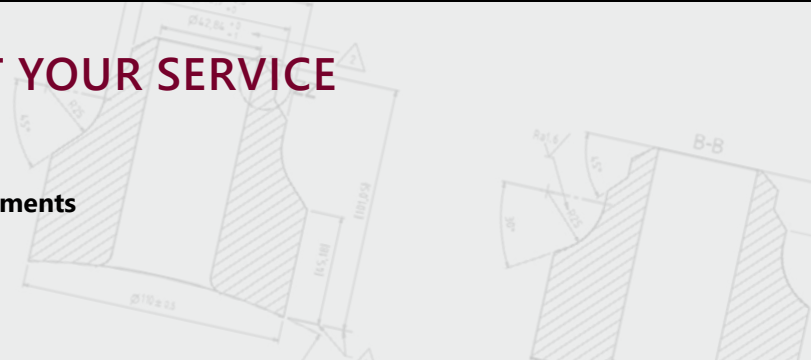
**MATERIAL:**  
UNS S32750  
PROJECT: BØYLA FIELD



## OUR TECHNICAL SUPPORT AT YOUR SERVICE

We are at your disposal for:

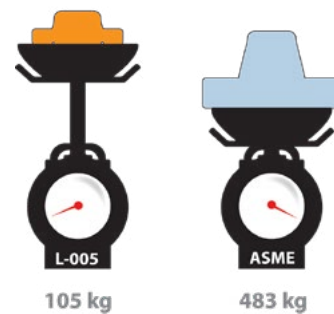
- Studies undertaken according to your requirements
- Flanges and forged pieces
- Special parts



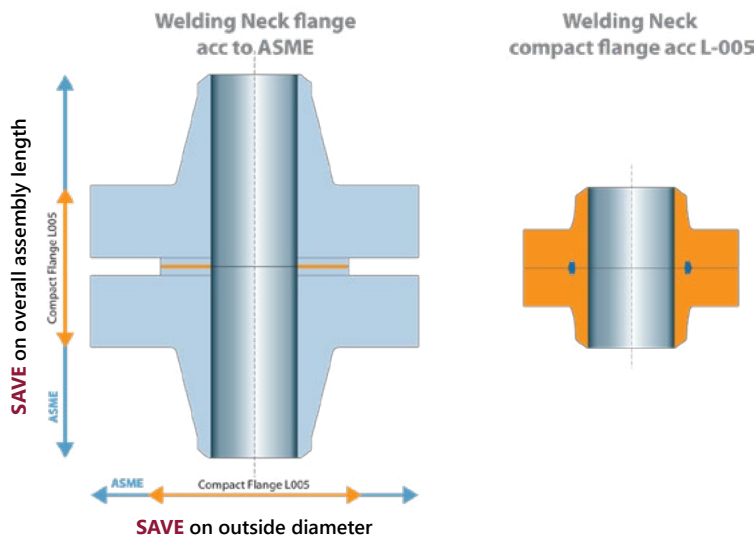
## COMPACT FLANGE VS. ASME FLANGE

Main benefits of L-005 compact flange

- Much **lighter** (save up to 80% on weight)
- **Smaller dimensions** (in both overall length and diameter)
- **More reliable** sealing : seal ring instead of gaskets
- No corrosion/erosion on flange faces (gapless)
- Multiple sealing areas
- No need to re-tighten bolts on a regular time scale



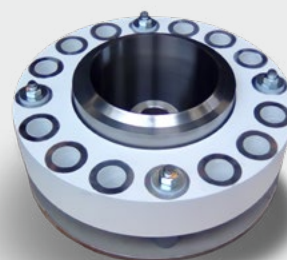
**78% weight saving!**  
Weight comparison WN 2500lbs 10"



INHOUSE MACHINING OF CF SWIVEL RING  
BLOCK 17 PHASE 2 TOTAL ANGOLA



HYDROTEST ON CF ASSEMBLY  
BLOCK 17 PHASE 2 TOTAL ANGOLA



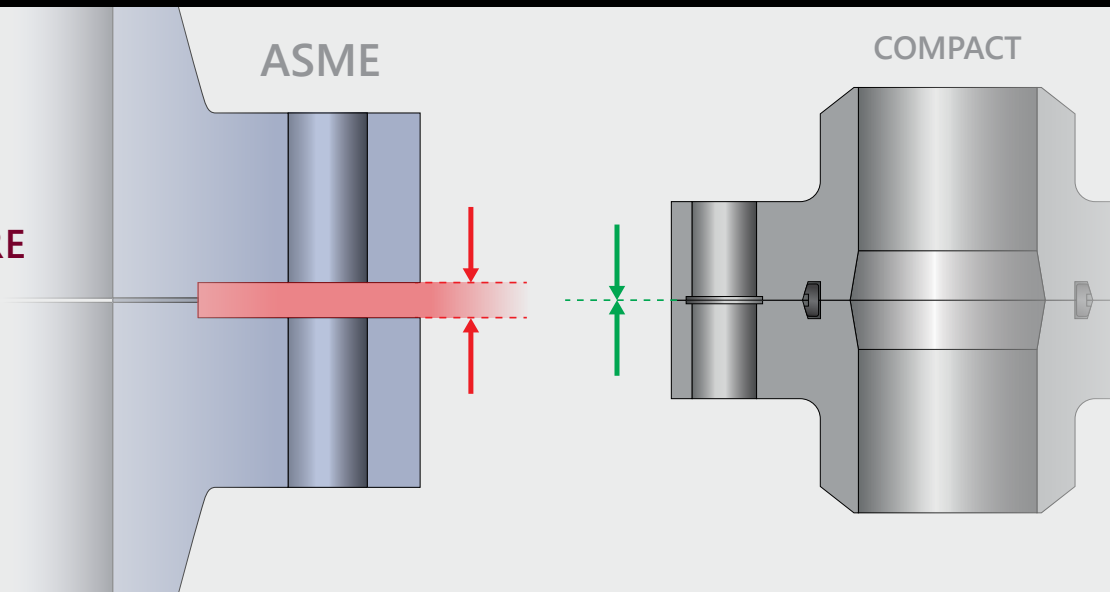
SWIVEL HUB & RING WITH SPECIAL COATING AND FLANGE FACE PROTECTION



WELDING NECK CF WITH PROPER PROTECTION ON FLANGE FACES

**NO FACE EXPOSURE**

No corrosion/erosion on flange faces (gapless)

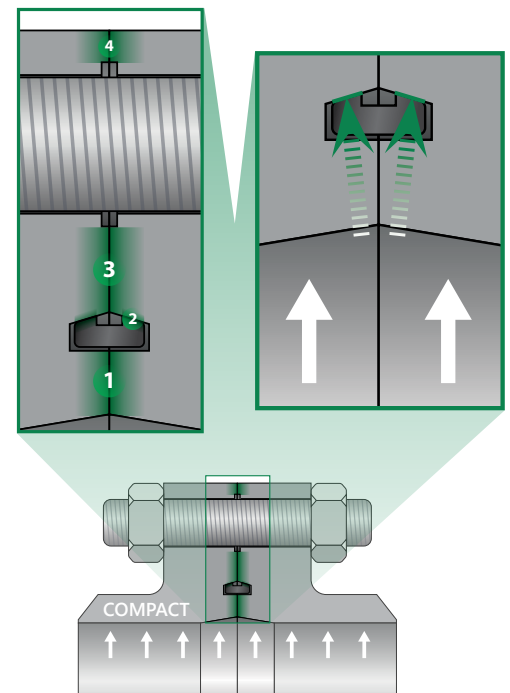
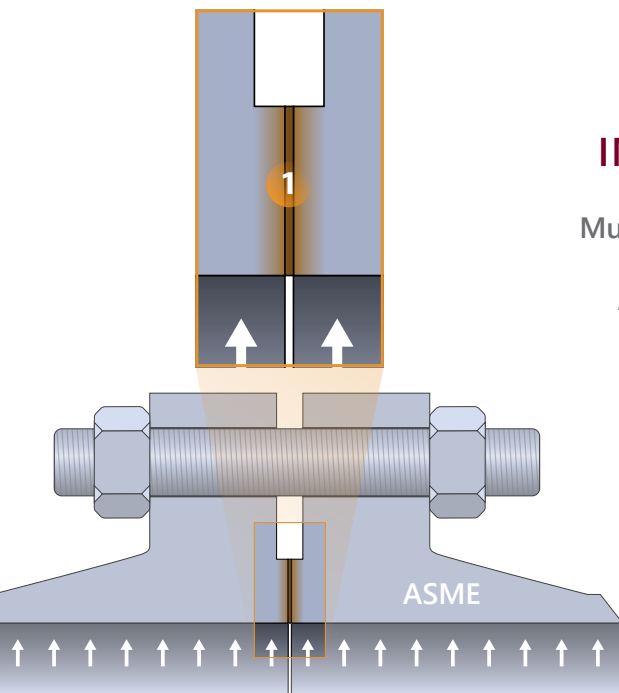


**IMPROVED SEALING**

Multiple sealing areas including:

An environment sealing to protect internal faces (4).

A prestrained gasket, reinforcing the seal with internal pressure force (2).

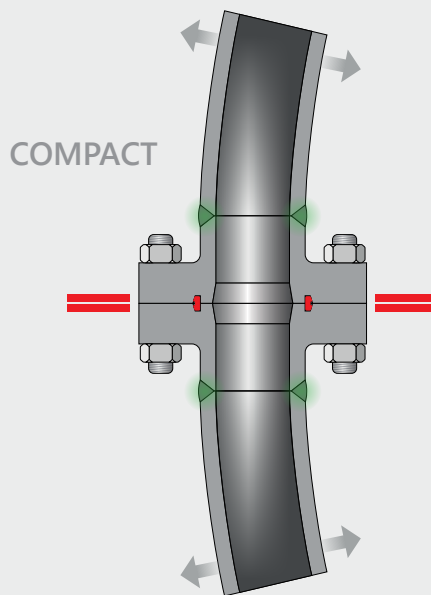
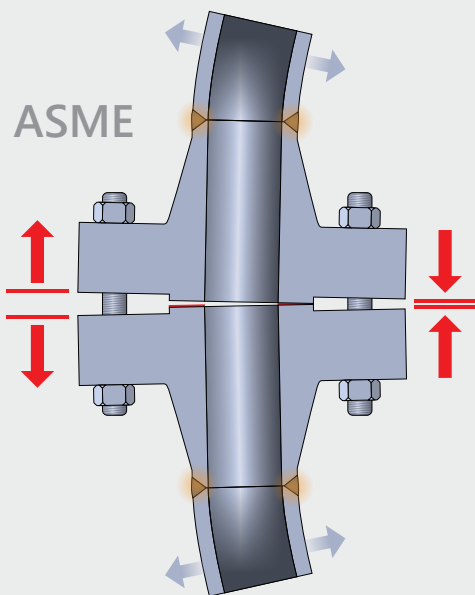


**STATIC CONNECTION**

Better integration to pipe continuity due to smaller collar part.

**LITTLE TO NO MAINTENANCE**

No need of regular bolt retightening due to micro movements loosening.



## INDUCTION BENDS FOR TOPSIDE APPLICATION & RISER SYSTEMS

Icarus works alongside with world leading manufacturer of pipe bends to provide a wide range of bending solutions :

■ **High Flexibility**

- All types of material : starting from seamless or welded pipes in CS, Alloy Steel, SS, DSS, SDSS, Nickel Alloy and **cladded pipes with weld overlay method**.
- Wide range of bend radius, angle and bend plane
- **Close tolerances** (optimum ID tolerances...)

■ **Several applications : sour service, low temperature, topsides, ...**

■ **Optimum Heat Treatment Process to meet the strict mechanical requirements**

- Stress relieving
- Normalizing
- Quenching & Tempering
- Solution Annealing

■ **Full compliance to International Standards and Specifications :**

- DNV (DNV-OS-F101, ...)
- TOTAL specifications (PVVs, PLR 231, ...)
- Chevron's specifications (PPL-SU-U737-D, ...)



**22" 3D Bends**  
Material : API 5L GrB X65

**8" 3D Bends**  
Material : Duplex UNS S31803

Contractor : HHI  
Client : BP  
Project : Clair Ridge

**6" 3D Bends**

Material : Duplex UNS S31803  
Contractor : Subsea7  
Client : Total  
Project : Pazflor  
Standards : DNV-OS-F101





**42" 5D Bends**

**Dimension :** ID 1068,4 mm x 54,5 mm  
**Material :** API 5L X65 PSL2 (SAWL)  
**Contractor :** DSME  
**Client :** Chevron Australia  
**Project :** Wheatstone Upstream Project

**6" & 10" 5D Induction Riser Bends**

**Material :** API 5L X60 QS PSL2  
**Contractor :** DSME  
**Client :** Chevron  
**Project :** Mafumeira Sul Project



**6" 5D Bends Pressure test**

**Material :** API 5L X65 PSL2 (DNV 450)  
**Contractor :** Technip France  
**Client :** Tullow  
**Project :** TEN Project  
**Standards :** DNV-OS-F101

**6", 8" & 10" 5D Bends**

**Material :** API 5L X65 PSL2 (DNV 450)  
**Contractor :** Technip France  
**Client :** Tullow  
**Project :** TEN Project  
**Standards :** DNV-OS-F101



## SUPPLY OF COMPLETE PACKAGE

We are able to provide you a complete package of products for your project

- Standard or special valves
- Piping & fittings
- Special parts from Engineering (flanges, forgings, ...)

## SERVICES PROVIDED

The entire range of supplied products is supported by an offer of complete services

- Quality assurance / Quality control
- Contract review
- Proven project management
- Following standards and specifications required by each project
- ITP management
- Third-party inspection
- Expediting
- Certificate management
- ...

## QUALITY ASSURANCE



## MORE THAN A PRODUCT

Icarus owns a dedicated team using integrated management (Quality / Engineering / Production), following the ISO 9001 / 14001 (Environment) / 45001(Health & Safety) and API Q1 requirements to ensure the highest level of quality management.

Each process is subject to a risk assessment in order to maintain this very same quality management level.

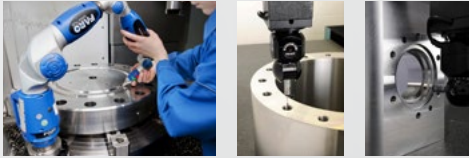
### RISK ASSESSMENT



## DIMENSIONAL ANALYSIS

Specific measurement tools

- FARO 3D measuring arm
- Wenzel 3D measuring table
- Someco Dynascan profile projector
- Coating thickness measurement tool
- Ultrasonic thickness measurement



## TEST RANGE

Non-destructive tests

- Magnetic particle examination
- Dye penetrant test
- PMI
- Feritscope®
- Hardness
- Ultrasonic test
- X-ray
- Pig gauge trial

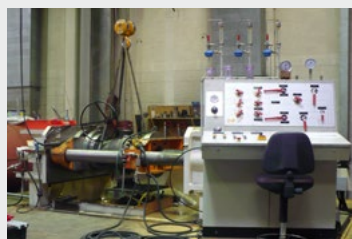


Additional tests on demand

## SIMULATION OF EXTREME CONDITIONS

Specific service or environment

- High pressure ( air / gas / water )
- Fugitive emission test (helium)
- Cryogenic test
- Fire test



## PRESSURE TESTS

Test capacities:

- Hydraulic up to 1200 bars
- Pneumatic up to 6 bars
- High pressure gas up to 1000 bars
- Cryogenic down to -196°C
- Leak detection test (with helium)

Test equipment:

- Presses
- Safety bunkers for pressure tests
- Cryogenic tanks

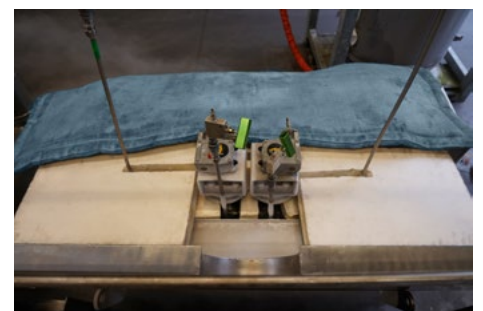


CRYOGENIC SETUP

**DEDICATED EQUIPMENT & TECHNICAL CAPACITIES**

In-house validation of cryogenic capabilities by testing @-196°C according to BS 6364, ISO 28921-1, EN 12567 or customer specifications.

Tightness testing with Helium.



# CUSTOM PRODUCTS & SOLUTIONS

- Experienced engineering team
- Most advanced modelling & simulation software

- FEA :
  - Samcef Field
  - Siemens NX
  - Ansys
- CAD :
  - Solidworks
  - Autodesk Autocad
- CAM :
  - Mastercam
- CFD:
  - Solidworks Flow Simulation



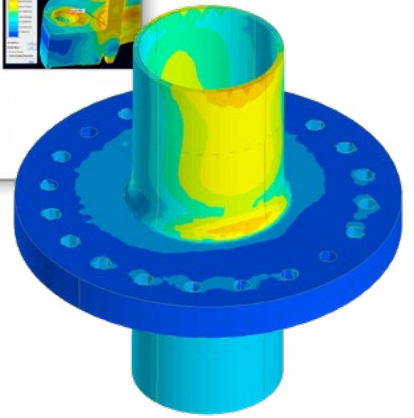
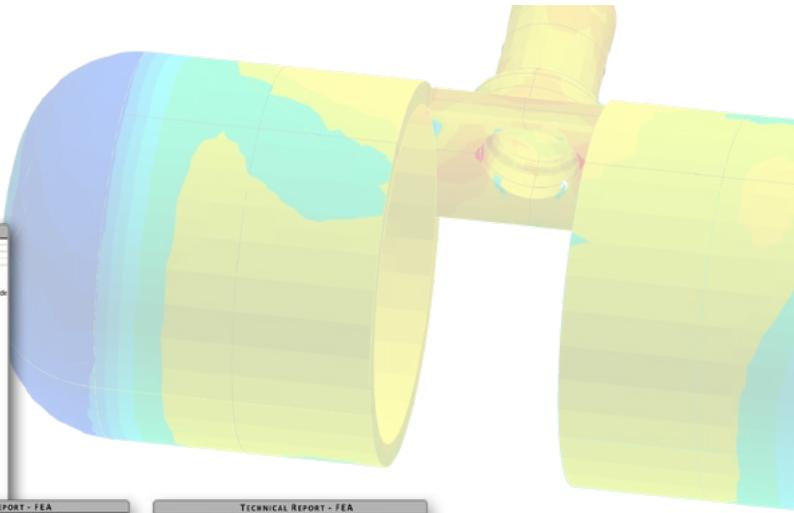
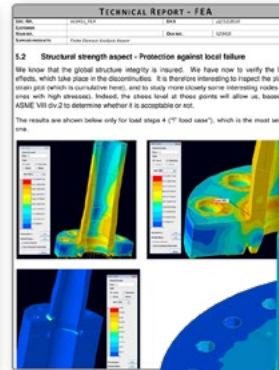
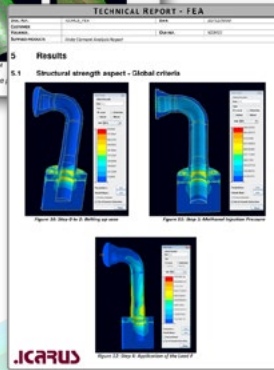
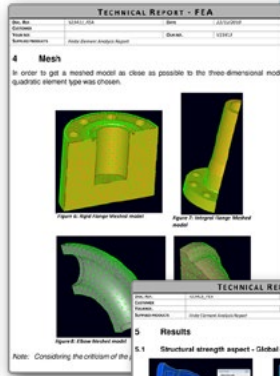
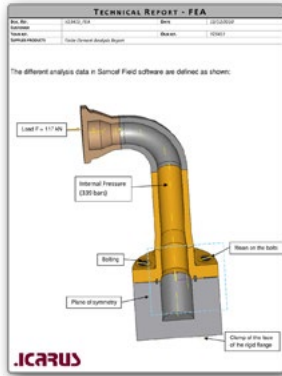
# CALCULATION NOTES

- Bolting calculation:
- Tightening torque
  - Reaction forces between parts
  - Working coefficient (safety)

- Stem dimensioning:
- Allowance for different shapes of stem-ends
  - Working coefficient
  - Maximum resistance of stem

- Wall thickness calculation for check valves

## IN-HOUSE FEA CALCULATION



## FINITE ELEMENT ANALYSIS FOR VALVES PARTS

- Ball/seat sealing
- Body resistance assessment
- Distortion verification (in order to ensure sealing)

